OPERATING INDUSTRIES, INC.
GAS MIGRATION
CONTROL OPERABLE UNIT

RECORD OF DECISION

RECORD OF DECISION

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DECLARATION

SITE NAME AND LOCATION

Operating Industries, Inc. (OII)
Monterey Park, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operating Industries, Inc. Site, in Monterey Park, California, developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. This decision is based upon the administrative record for this operable unit at this site. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

The State of California concurs with the selected remedy.

DESCRIPTION OF THE REMEDY

This is the third operable unit for the OII site. As an operable unit this document addresses only the issue of landfill gas (LFG) migration control. The Gas Control Remedial Action will be integrated with the final site remedy as the component for collecting and destroying landfill gas which would otherwise be released from the site. Final cover, leachate collection, groundwater, slope stability, soil contamination, and final closure will be fully addressed in the final Remedial Investigation/Feasibility Study for the site, or in future Operable Units.

The major components of the selected landfill gas control remedy include:

- Installing 58 new perimeter LFG extraction wells, as shown in Figure 5, with placement focused on minimizing offsite LFG migration.

- Installing 48 pile driven wells on the top deck of the landfill with placement focused on maximizing source control of LFG.

- Installing 50 shallow and 12 deep slope wells with placement focused on reducing surface emissions, and controlling intermediate to deep subsurface migration at the perimeter.
- Installing new integrated perimeter and interior LFG headers (abovegrade).
- Utilizing functional existing gas extraction wells and gas monitoring probes.
- Installing 58 multiple completion monitoring wells at the property boundary.
- Installing landfill gas destruction facilities with a capacity of approximately 9,000 cfm, and an automated control station for the gas control system.
- Installing abovegrade condensate sumps to collect condensate from gas headers.
- Installing leachate pumps in gas wells to de-water saturated zones, and installing abovegrade leachate sumps.

DECLARATION

The selected remedy is protective of human health and the environment, a waiver can be justified for whatever Federal and/or State applicable or relevant and appropriate requirements which will not be met, and it is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of the final remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

9.30.88
Date

Daniel W. McGovern
Daniel W. McGovern
Regional Administrator
EPA, Region IX

DECISION SUMMARY

OPERATING INDUSTRIES, INC.

GAS MIGRATION CONTROL OPERABLE UNIT

RECORD OF DECISION

SCOPE AND ROLE OF OPERABLE UNIT

The Operable Unit Feasibility Study (OUFS) for Landfill Gas (LFG) Migration Control at the Operating Industries, Inc. (OII) Landfill in Monterey Park, California, has been conducted to evaluate potential remedial alternatives for mitigating the LFG problems at the site. The U.S. EPA is addressing LFG problems as an operable unit so that a gas migration control remedial action can be initiated prior to implementation of the overall final remedial action for the site. The Gas Control Remedial Action will be integrated with the final site remedy as the component for collecting and destroying landfill gas which would otherwise be released from the site.

As an Operable Unit, this document addresses only the issue of LFG migration control. It does not address other issues such as leachate and condensate management, groundwater contamination, final site closure, and final remedy. This is the third operable unit for the OII site. A Record of Decision (ROD) for Site Control and Monitoring was signed on July 31, 1987, and a ROD for Leachate Management was signed on November 16, 1987. Final cover, leachate collection, groundwater, slope stability, soil contamination and final closure will be addressed in the final Remedial Investigation/Feasibility Study for the site, or in future Operable Units.

SITE DESCRIPTION

The OII Landfill is located at 900 Potrero Grande Drive, Monterey Park, 10 miles east of Los Angeles (Figure 1). The site is 190 acres in size with 145 acres (south parcel) lying south of the Pomona Freeway (California Highway 60) and 45 acres (north parcel) to the north. Ground surface elevations adjacent to the south parcel vary from approximately 500 feet above mean sea level (msl) along the south boundary to approximately 380 feet above msl along the Pomona Freeway. The top of the south parcel varies from 620 to 640 feet above msl. The north parcel is relatively level. The site is owned by Operating Industries, Inc., and related entities.

The adjacent land ownership is as follows:

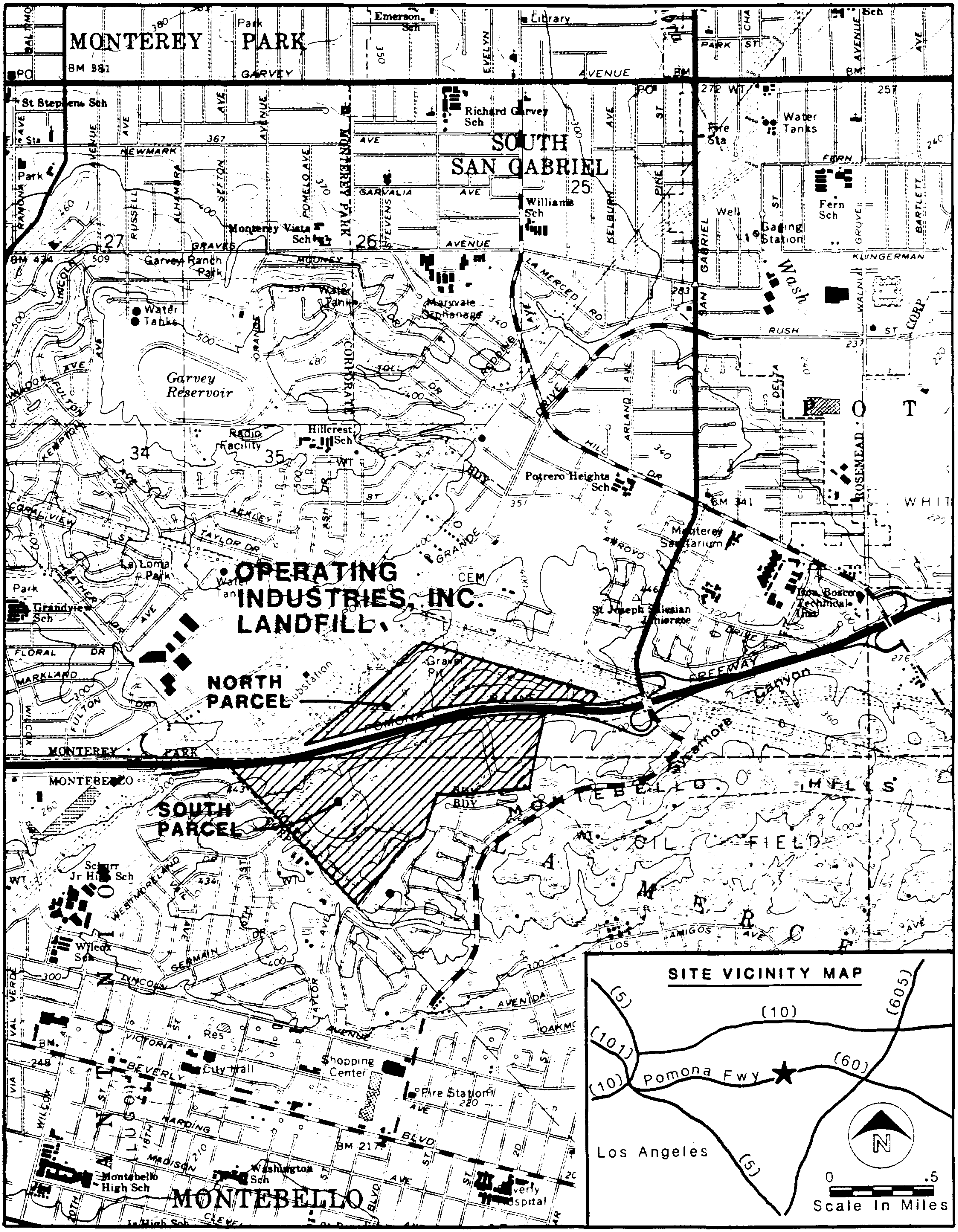
- The Southern California Edison Company (SCE) owns the land abutting the north parcel, north of the Pomona Freeway. The SCE substation complex is located south of Potrero Grande Drive on the west side of Greenwood Avenue. A nursery leases the remaining SCE property.

- The land east of the south parcel, bounded by the Pomona Freeway, Montebello Boulevard, and Paramount Boulevard, is owned by Chevron U.S.A., Inc., and is currently undeveloped. It is currently used for oil recovery by Chevron.

- The Southern California Gas Company, a subsidiary of the Pacific Lighting Gas Supply Company, operates an underground gas storage facility in the area adjacent to the west boundary of the landfill.

- A piece of property to the south is jointly owned by Continental Development of California, Inc., and California Bankers Trust Company.

- The remaining land adjacent to the landfill is primarily residential with single-family homes to the south and southwest of the landfill boundary. The City of Montebello's Iguala Park also borders the southern boundary of the landfill.



0 1000 2000

Scale In Feet

Base Map USGS 7.5 Min.
El Monte Quadrangle 1966
Photo Revision 1981

FIGURE 1
SITE LOCATION MAP
OPERATING INDUSTRIES, INC. LANDFILL
OUFS-GAS MIGRATION CONTROL

LAND USE AND DEMOGRAPHY

The City of Monterey Park zoning ordinance designation for the OII Landfill is M, Manufacturing. In Monterey Park, land to the northwest of the landfill is zoned C-4 (Arterial Service Commercial), C-M (Heavy Commercial-Nonmanufacturing). To the south and west of the landfill, land use primarily consists of residential units (single-family houses). Land to the east is zoned R-A-O, Residential, Agricultural, Oil Production District. A cemetery lies to the northeast along Potrero Grande Drive, and the remainder of this area, between Neil Armstrong Street and Paramount Boulevard, is zoned residential.

The City of Monterey Park has a population of 54,338 and the City of Montebello has a population of 52,929 (1980 Census). Within a three-mile radius of the site there are approximately 53,000 residences.

Regional Hydrogeology

OII is located in the La Merced Hills, between two major groundwater basins: the San Gabriel Basin to the north and east, and the Los Angeles Central Basin to the south.

The San Gabriel Basin aquifer system to the north includes both semiconsolidated and unconsolidated nonmarine sedimentary deposits of Pleistocene and Holocene age. The pattern of groundwater movement within this basin is generally from the perimeter mountains toward the Whittier Narrows. Subsurface outflow and surface flow in the Rio Hondo and San Gabriel Rivers through the Whittier Narrows provide a major source of recharge to the Los Angeles Central Basin, from the San Gabriel Basin to the north.

Los Angeles Central Basin aquifers consist of consolidated to unconsolidated marine and nonmarine rocks ranging from late Pliocene to Holocene age. Regional flow is generally to the west.

The depth and character of the water-bearing strata adjacent to and beneath the OII site are not well understood. Water level measurements from existing wells suggest that perched, unconfined, and confined zones may be present, but have not been adequately identified or characterized. Additional wells will be installed to define hydraulic gradients and to identify potential contaminant migration pathways as part of EPA's ongoing RI/FS at the site.

SURFACE-WATER HYDROLOGY

The major surface streams that receive run-off from the Montebello Hills are the Rio Hondo and Los Angeles Rivers. Tributaries to these drainages in the area of the OII Landfill contain only ephemeral flow generated by storm or urban run-off. The majority of natural drainages have been extensively modified and channelized or diverted to storm sewers.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Disposal operations at the OII Landfill site began in October 1948, when the Monterey Park Disposal Company (MPD) leased 14 acres from Henry H. Wheeler. An operations agreement between the City of Monterey Park and MPD provided that MPD would operate a municipal landfill on behalf of the City.

The landfill reverted to private ownership by the OII corporation in early 1952 when zoning variances for operating the landfill were not obtained by MPD. The site expanded to 218 acres as additional Wheeler property was obtained in 1953 and 1958.

The landfill was classified as Class II-I by the Los Angeles Regional Water Quality Control Board (LARWQCB) in October 1954. It was permitted to accept Group 2 wastes (ordinary household refuse, decomposable organic refuse, and selected scrap metal), Group 3 wastes (nondecomposable inert solids), and certain types of liquids.

The State of California (CALTRANS) purchased 28 acres from OII for the construction of the Pomona Freeway (completed in 1964), which separated the site into the 45-acre north parcel and the 145-acre south parcel. In August 1975, the Monterey Park City Council adopted Resolution 78-76, which eliminated solid waste disposal on the north parcel and on a 15-acre area in the northwestern section of the south parcel. Thus, after 1975, solid waste disposal was limited to a 130-acre section of the south parcel.

The height of the landfill was first limited to 540 feet in 1957 based on the height of the surrounding hills. The City of Monterey Park increased the height limit to 605 feet in June 1975, and to 640 feet in August 1975.

In March 1976, the LARWQCB restricted disposal of liquids to a 32-acre area in the western portion of the south parcel. OII was allowed to mix liquids with solid refuse at a ratio of 10 gallons per cubic yard; the ratio was increased to 20 gallons per cubic yard in September 1976. Leachate generated at the site was collected and redisposed.

OII ceased accepting hazardous liquid waste in January 1983 and all liquid waste in April 1983. The California Department of Health Services (DOHS) classified leachate generated at the site as hazardous and prohibited redisposal, effective October 1984. OII stopped accepting all solid waste in October 1984.

Facilities have been constructed on the landfill to monitor and provide limited control of the offsite migration of landfill gas (LFG) and leachate from the landfill. A commercial gas recovery facility, referred to as the interior gas extraction system, was constructed by GSF Energy, Inc., in the interior area of the landfill. These systems are described in the following sections.

Landfill Gas Monitoring Probes

Sixteen LFG monitoring probes were installed by OII onsite along the west, south, and east borders of the south parcel of the landfill in 1976. In December 1981, 15 probes were added and the total 31 probes allowed LFG monitoring along the entire perimeter of the south parcel. In addition, 15 LFG monitoring probes were installed in the north parcel. Thirty-five perimeter probes were installed in July and August 1981 along the west and southwest boundaries to monitor the effectiveness of the air dike system.

Perimeter Gas Extraction System

The perimeter gas extraction system was installed by OII in five major phases on the south parcel to partially control offsite migration of LFG. Phase I (the air dike injection system), installed in 1981, consists of approximately 31 wells on the west border. This air dike injection system introduces air under pressure into the ground at the landfill perimeter to induce a positive pressure gradient and air flow as a barrier to LFG migration away from the landfill. Phases II/III/IV of the system, consisting of LFG extraction wells along the southern and eastern borders, were installed in 1982, and 1983.

After the wells were installed, gas was collected using a portable blower and flare system. In 1983, a permanent blower and flare station (now known as the auxiliary flare) was installed in the southwest corner of the landfill, and the wells were connected with a header system. By July 1983, both the auxiliary flare and portable system were in operation. Phase V wells were connected in May 1984.

The rim well system on the southeast slopes was also added in 1984. This system collects landfill gas from an upper bench of the landfill near the southern perimeter. The wells are relatively shallow, and extract LFG from the above-ground portion of the landfill. The rim wells are connected to the perimeter gas extraction system and, therefore, operate independently of the nearby interior gas extraction system. A new flare station (now known as the main flare) in the northwest corner of the landfill was added in 1984.

Leachate Collection System

The leachate collection system is described in the EPA Leachate Management ROD of November 16, 1987, and is not described further here. Liquids collected from the gas extraction system will be managed under the Leachate Management Remedial Action, or subsequent Leachate Management provision of the final remedy for the site.

Interior Gas Extraction System

GSF (then called NRG NuFuels, Inc.) signed a contract with OII in August 1974 to develop a LFG recovery system for commercial purposes at the OII Landfill site.

The GSF gas collection system and plant began recovering methane for sale to Southern California Gas Company in October 1979. After deciding that continued resource recovery operations at OII were no longer economically viable, GSF relinquished ownership of all subsurface facilities to OII per their contract and notified the EPA that they intended to dismantle their aboveground facilities by March 1, 1987.

In April 1987, GSF, the EPA, and the South Coast Air Quality Management District (SCAQMD) completed negotiations for the purchase of GSF surface facilities using OII trust fund monies held by the SCAQMD. Extraction and flaring of LFG continued from February to May 1987 under temporary agreement between GSF, the SCAQMD, and the EPA. At present, LFG extraction and flaring are operated by the EPA.

EPA is currently performing operation and maintenance of the existing leachate collection system, the existing perimeter gas extraction system, and the existing interior gas extraction system. The system operation and maintenance includes daily monitoring of LFG probes (onsite and offsite, including water meter boxes), conducting scheduled maintenance of blower/flare stations and compressor equipment, and maintaining site security. This is described in the EPA Site Control and Monitoring ROD of July 31, 1987.

In addition, the EPA is conducting a remedial investigation/ feasibility study (RI/FS) to determine the nature and extent of contamination resulting from the site and to assess potential remedial actions.

Enforcement

Various state and local agencies have recorded that Operating Industries frequently violated waste disposal regulations during the operating life of the landfill from 1952 to 1984. Site inspections identified some of these violations and agencies notified Operating Industries to correct the noted problems.

Recent State and Local enforcement actions include:

1978 - Order for Abatement 2121 (South Coast Air Quality Management District) - The Order includes site maintenance, grading, soil cover, and waste disposal. The order has been modified six times. In 1983, installation of a gas emissions control system and a permanent leachate control system were added. OII has not complied with the major requirements of the order.

1980 - (California Waste Management Board) - Listed site on the California Open Dump Inventory due to RCRA subtitle D violations.

1981 - Cease and Desist Order (L.A. County DOHS) - Issued to OII for operating the landfill without an approved plan for control of landfill gas.

1982 - (City of Montebello) - Filed suit for permanent closure of the landfill to abate a continuing public nuisance.

1983 - Notice and Order (L.A. County DOHS) - Cited violations of California Administrative Code.

Supplemental Notice and Order (L.A. County DOHS) - Reiterates Order requirements, requires installation of gas probes, wells, daily monitoring of gas systems, reporting to L.A. County DOHS, CWMB, and SCAQMD.

1984 - Temporary Restraining Order 0500141 (CA DOHS) - Order to secure financial resources from OII for closure.

30-Day Preliminary Injunction (CA DOHS) - Addressed activities required for closure.

Remedial Action Order LA001 (CA DOHS) - Required leachate management, site characterization, landfill gas control, and closure plans.

Notice of Violation to OII (CA DOHS) - Notification of noncompliance with Remedial Action Order.

Clean-up and Abatement Order 84-5 (Regional Water Quality Control Board) - Reiterates requirements of CA DOHS Order, required phase-out of leachate redisposal, and construction/operation of a permanent leachate control system.

Clean-up and Abatement Order 84-119 (RWQCB) - Required interception, pumping and legal disposal of leachate, and prohibited discharge of leachate on and off-site.

EPA enforcement activities include:

1982 - Section 3008 Notice - Notice of EPA Interim Status Part 265 RCRA violations at OII.

1983 - RCRA Complaint Issued.

OII submitted draft closure documents in lieu of Part B.

RCRA Consent Agreement Signed

1984 - 3007/104 letters issued to OII and GSF.

OII proposed for the National Priorities List

RCRA Section 3007/CERCLA Section 104 Notice Letters/Information Requests issued to Operating Industries, Inc, and individual owners. (8/23/84)

1986 - OII finalized on NPL

General Notice Letters/3007/104 Information Requests sent to 27 Potentially Responsible Parties representing 50 percent of manifested wastes. (6/20/86)

Follow-up 3007/104 Letter sent to OII owners.

1987 - General Notice Letters/3007/104 Information Requests sent to 56 additional PRPs representing an additional 20 percent of manifested wastes. (1/9/87)

Follow-up 3007/104 Letter sent to OII owners.

Negotiations for PRP conduct of RI3/FS held, settlement not reached.

General Notice Letters/3007/104 Information Requests sent to 106 additional PRPs representing an additional 10 percent of manifested wastes. (11/4/87)

1988 - Joint Special Notice and Demand Letter issued to all noticed PRPs, including OII owners for past costs, design and construction of the Leachate Management Remedial Action, and Site Control and Monitoring Activities and EPA's associated oversight costs (2/18/88). Negotiations in progress.

Special Notice Letter/3007/104 Information Request sent to City of Monterey Park. (2/18/88)

COMMUNITY RELATIONS HISTORY

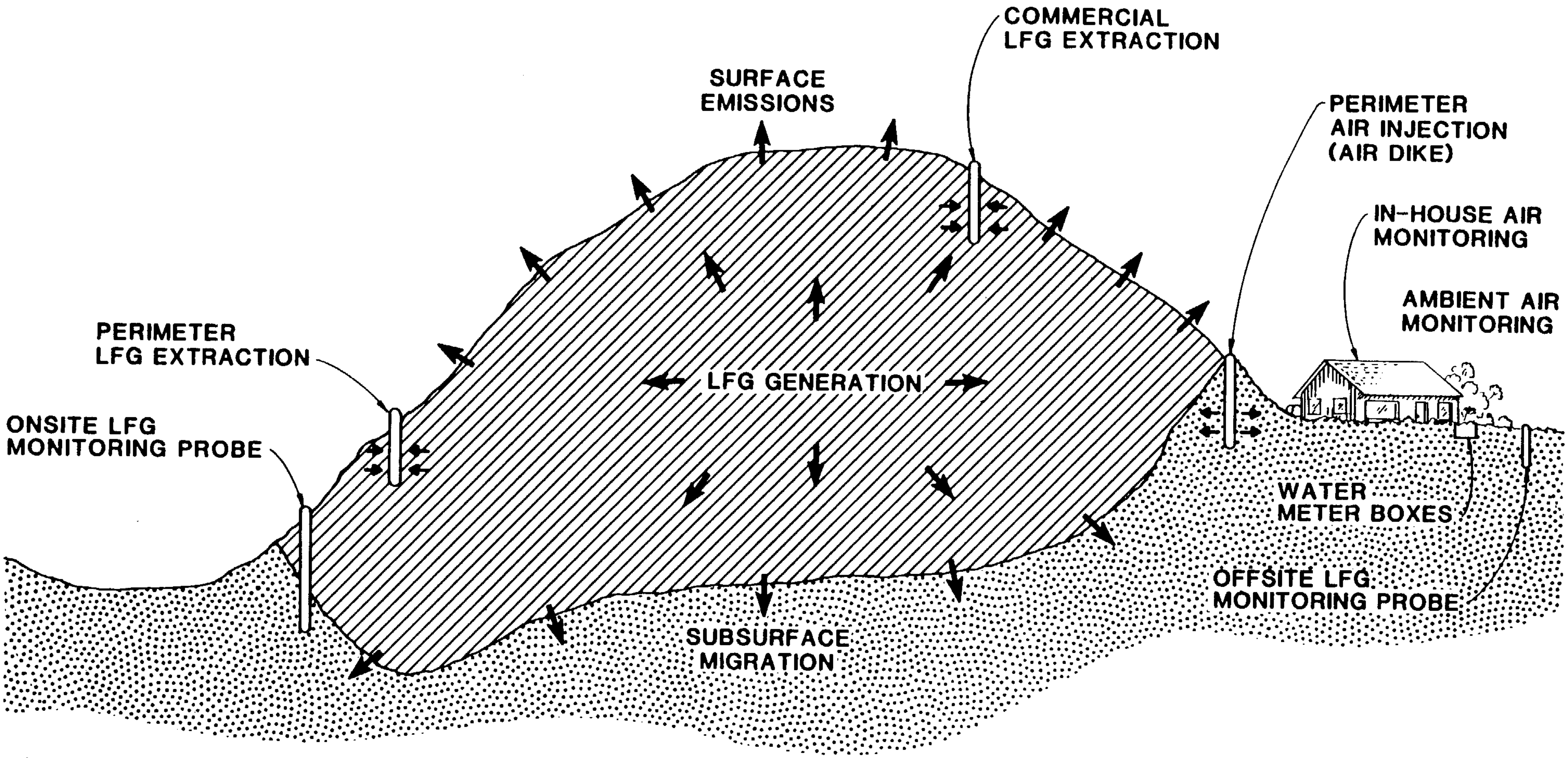
A history of community relations activities at the OII site, the background on community involvement and concerns, and specific comments on the Feasibility Study and EPA's responses are found in the Responsiveness Summary which accompanies this ROD.

SITE CHARACTERISTICS

Figure 2 illustrates the mechanisms at work in generation, emission, and subsurface migration of gases at the OII Landfill. The four major mechanisms of gas migration at OII are:

- Generation by anaerobic decomposition of the refuse within the landfill combined with volatile organic compounds released by hazardous substances disposed of at the landfill

- Surface emissions by releases and diffusion to the atmosphere through the top and sides of the landfill as well as from other areas where gas has migrated in the subsurface to the surrounding neighborhood



LEGEND

PATH OF LFG MIGRATION

REFUSE

FIGURE 2
SCHEMATIC OF LFG MIGRATION
FROM OII LANDFILL SITE
OPERATING INDUSTRIES, INC. LANDFILL
OUFS-GAS MIGRATION CONTROL

- Subsurface migration by releases and diffusion through the bottom (below ground surface) boundaries of the landfill

- Collection and partial control by existing perimeter extraction, which removes gas along portions of the landfill slopes and boundary; by perimeter air injection, which provides an air curtain for partial containment along portions of the landfill boundary; and by existing interior extraction, which removes gas from within the interior of the landfill

GAS GENERATION

The estimated 1988 methane generation rate from the landfill is between 3.8 million and 5.2 million standard cubic feet per day (mmscfd). Although the average methane generation is decreasing, it may continue for 35 years or more (Figure 3).

During 1987 and early 1988 EPA installed 15 multiple completion gas monitoring wells. Probes were installed at up to six different depths, extending down to 340 feet. These probes are now being monitored by EPA for methane concentrations, gas pressure and sampled for analysis of other constituents in the gas stream. Contaminants which have been detected include benzene, carbon tetrachloride, 1,1-dichloroethane, 1,1-dichloroethylene, perchloroethylene, trans-1,2-dichloroethylene, trichloro ethylene, toluene, vinyl chloride, and 1,1,1-trichloroethane.

Probe monitoring data support the evaluation of subsurface LFG migration. In the areas of high subsurface LFG migration identified in the west and east ends of the landfill, the new probes also showed high levels of methane. With the exception of LFG monitoring wells (GMW) No. 2 and No. 3, the probes on the east and west ends of the landfill also showed high levels of methane extending to the depth of the waste mass within a radius of 1,000 feet of the probe location. This information from the deep monitoring probes indicated that subsurface LFG migration is occurring at greater depths than previously known, and supports the recommendation in the FS for installing deep LFG extraction wells and monitoring probes at the perimeter in these areas.

The EPA probes located in the areas identified as having low LFG migration in the FS generally showed lower concentrations than the probes located on the east and west ends of the landfill. Several of these probes showed methane concentrations exceeding 5 percent, the lower explosive limit (LEL).

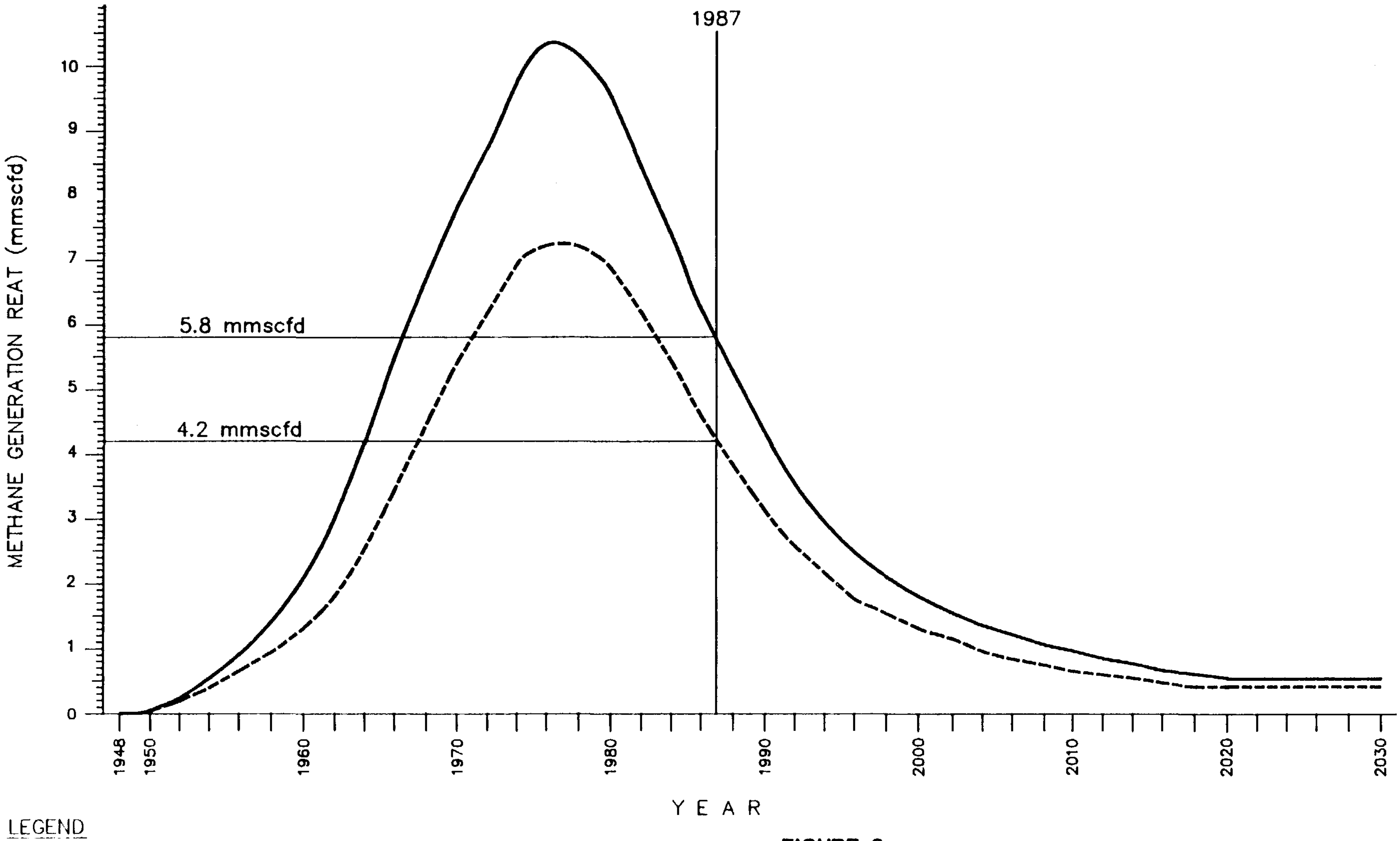


FIGURE 3
ESTIMATED MINIMUM AND MAXIMUM POTENTIAL METHANE GENERATION RATES VS TIME
OPERATING INDUSTRIES, INC. LANDFILL
OUFS-GAS MIGRATION CONTROL

Additional source control and perimeter extraction wells proposed for other areas may also reduce methane levels in this area. However, the new data indicates that additional gas extraction wells may be required in areas of low methane migration if methane concentrations above 5 percent persist. The number and placement of these wells will depend on future monitoring data.

In summary, new EPA monitoring probe data verifies the presence of methane at concentrations greater than 5 percent in both the shallow and deep probes in the previously identified high migration areas. The data supports the distinction between high and low migration, but indicates that some additional gas extraction wells may also be required in the low migration areas.

At the eastern boundary of the site, subsurface investigation conducted by Geotechnical Consultants, Inc. (GTC) indicated deposits of refuse within Chevron U.S.A. property. The approximate extent of refuse at the east end of the landfill is shown in Figure 4. This composite figure was prepared based on an existing topographic map of the landfill and the conclusions drawn by GTC.

Gas migrating in the subsurface on the Chevron property to the east of the site would be more effectively controlled with perimeter wells installed at the boundary of the refuse (which extends off the OII property in this area) rather than wells installed at the legal property boundary. The zone of influence of wells installed on the legal boundary would have to extend to the perimeter of the waste mass in order to control gas migration. Establishing such zones of influence within the waste mass could lead to excessive oxygen intrusion, creating the potential for underground fires. Smaller zones of influence within native soil could be used to control gas migration if the wells were installed at the boundary of the refuse. The gas control alternatives that involve increased gas extraction on the South Parcel have the flexibility for modification of the conceptual design for gas well and header placement, to better address gas control in this area. This modification consists of locating the perimeter wells and perimeter header line at the edge of the refuse and potentially redistributing a portion of the slope wells in this area. These modifications can be accomplished during the design phase without altering the cost estimates for the alternatives. Field work during the design phase will more precisely define the extent of refuse in this area.

Landfill gas is also being generated within the 11 acres of waste located on the North Parcel of the OII site as confirmed by field monitoring of EPA probes in 1987. A more detailed discussion of the LFG investigation can be found in the Preliminary North Parcel Site Characterization Report, March 4, 1988.

Methane concentrations of 5 to 82 percent were found in the probes placed within the waste mass and at the perimeter of the waste mass. Generally, during monitoring, LFG was found to be prevalent within the landfilled area, as well as at the northwestern and southwestern boundaries of the North Parcel. Lab analysis of LFG samples confirmed the presence of elevated levels of methane. Carcinogenic and toxic organic compounds were also found in the landfill gas.

Methane levels (and, for the most part, levels of carcinogenic and toxic compounds) were found to be lower on the eastern portion of the North Parcel outside of the fill area. EPA believes that the majority of the compounds present in this area are due to the migration of gas away from the landfill areas on the North and South Parcels. EPA presently assumes that control of the gas migration problems of the filled areas of the North and South Parcels should eliminate the existing gas problem on the eastern portion of the North Parcel. Based upon EPA evaluation of the volume of the waste mass and the age of the waste, the North Parcel is beyond the peak of methane generation and is producing approximately 9,000 to 14,000 cubic feet of methane gas per day.

Contaminant Release

LFG that is not collected by the gas collection systems and destroyed by flaring is released by surface emissions or migrates laterally through porous soil, and thus contributes to emissions offsite around the landfill.

A portion of the LFG generated in the landfill is released or emitted by venting mechanisms through the landfill cover. The heat generated by the biochemical reactions in the landfill increases the vapor pressure and the rate of volatilization of organic chemicals present in the waste. The molecular weight, reactivity, and water solubility of each chemical also affect volatilization. Once volatilized, the organic chemicals are transported with the LFG by dominant mechanisms such as diffusion, convection, and barometric pressure pumping.

These release mechanisms have been documented by data on emissions from the landfill surface. The areas onsite with the highest amount of emissions (measured as methane) appear to be the slopes. The slopes have a thinner cover and are prone to surface erosion and instability causing fissures and cracks. These areas, which will be further monitored during the upcoming RI/FS air sampling tasks, also abut many residences.

Subsurface LFG migration is another release mechanism at the OII landfill. Methane has been detected in water meter boxes and offsite probe locations in the residential neighborhoods at concentrations above the lower explosive limit. Historically, the area to the northwest of the landfill has not exhibited detectable levels of methane in the water meter boxes. The neighborhood to the southwest has continued to exhibit elevated levels of methane despite the existing LFG migration control systems at the landfill.

Contaminant Transport Pathways

Contaminants contained in the LFG either migrate offsite in subsurface soils, or are emitted to the ambient air through the landfill cover. Subsurface migration primarily occurs by diffusion (due to concentration gradients) and convection (due to pressure gradients) through refuse and soil. Chemical contaminants are released to ambient air through the landfill cover onsite or via surface soils around the landfill offsite and are transported by wind and prevailing air drainage patterns.

Contaminants may also move through the void spaces in underground utility conduits. The water meter box data indicate that this has occurred and is still occurring in the southwest section.

Urban development adjacent to the OII site in the mid-1970s resulted in extensive grading and modifications of the original topography. Grading required for access roads and residential lots resulted in excavation of ridges and placement of fill in low areas. Replaced fill, unless compacted effectively, may be more permeable to LFG than undisturbed material.

Geologic formations, such as faults, may also act as pathways for migration. Several faults have been identified in the area.

SUMMARY OF SITE RISKS

A preliminary risk assessment was performed to evaluate the potential public health impacts. This assessment focused only on the LFG issues; other issues will be incorporated into the risk assessment for the site in the overall RI/FS.

As of December 1986, many of the water meter boxes that previously had high methane readings close to the landfill were vented to prevent the build up of methane or other volatile contaminants. The data collected prior to venting indicated the presence of methane in concentrations within the explosive range. Methane concentrations continue to exceed the lower explosive limit in some of these boxes, and additional venting is planned as part of the Site Control and Monitoring Remedial Action. These data are useful for demonstrating that subsurface migration is occurring and still presents a risk if allowed to build up to high concentrations in enclosed spaces. Venting of meter boxes does not eliminate the potential for fire and explosion, since homes, sheds and other enclosed spaces are adjacent to the site. The potential for fire and explosion can only be eliminated by controlling landfill gas to below the the explosive limit (5%) of methane.

Methane build-up in enclosed spaces has been demonstrated at the OII site and may pose an acute and imminent hazard due to the risk of fire and explosion. Methane is a highly flammable gas at concentrations between 5 percent (LEL) and 15 percent (UEL). The water meter box and offsite probe data demonstrate that methane gas has migrated offsite, and methane has accumulated to concentrations up to 70 percent by volume in the meter boxes. If air is added to the enclosed space and decreases the concentrations to within the combustible range, a spark, lighted cigarette, or match can cause an explosion.

The preliminary risk evaluation is based solely on the LFG problem and the chronic effects of LFG components such as benzene and vinyl chloride to humans over a long-term exposure at the site. Methods assessed in the operable unit to remediate the methane problem may also alleviate the other components (e.g., benzene and vinyl chloride).

The risks associated with exposure to volatile organic compounds (VOCs) are estimated for the residential and occupational scenarios with inhalation as the only exposure route considered. The inhalation route is considered in the OUFS risk assessment since it is the criterion to be used to determine feasible technologies for the gas problem. The ambient air data were assumed to represent the air quality inside the houses. In-house data indicated the potential presence of contaminants, but were not used for residential exposure because the data were of questionable quality.

The population potentially exposed to these contaminants includes 2,150 people within 1,000 feet of the landfill as demonstrated by available data.

Contaminants detected in at least 10 percent of the ambient air samples include benzene, carbon tetrachloride, perchloroethylene, trichloroethylene, vinyl chloride, 1,1,1-trichloroethane, and toluene. Of these vinyl chloride is the only compound for which there is an ambient air quality standard, which is 10 ppb. The mean concentration between August 1983, and August 1986, was 1.8 ppb, and the maximum concentration was 14 ppb. The standard was exceeded 16 days during this time period, with the last exceedance occurring on August 23, 1985.

More defined information will be available for the final risk assessment to be included in the overall RI/FS after additional ambient and in-house air monitoring data is collected.

Exposure is estimated based on EPA's Superfund Public Health Evaluation Manual (1986) and CH2M HILL Risk Assessment Guidance document (1986).

The daily chemical intakes via inhalation of noncarcinogens for a 70-kg adult and for 30-kg and 10-kg children in a residential setting were compared to acceptable intakes for chronic exposure (AIC). None of the contaminants exceeded the AIC. The daily chemical intake for the occupational scenario did not exceed the acceptable chronic or subchronic intake levels.

The Hazard Index for multiple exposures was calculated at less than one, therefore, no effect is expected to occur from exposure to the toxic chemicals at the levels found around OII.

The excess lifetime cancer risk was estimated at 1.6×10^{-4} for the residential setting and 5.4×10^{-5} for the occupational scenario. The cancer risk was dictated primarily by benzene and vinyl chloride. However, benzene was not detected in 85 percent of the samples collected and vinyl chloride was not detected in 50 percent of the samples. The detection limit for benzene was 5 ppb in 1983 and 2 ppb in 1984. Thus, the cancer risk was calculated using limited data, and was affected by sensitivity in the analytical technique. Additional data from upcoming ambient air monitoring should allow a distinction between the background risk posed by ambient air in the area, and additional risk posed by contaminants from the OII site. This risk assessment will be presented in the overall RI/FS for the site.

DOCUMENTATION OF SIGNIFICANT CHANGES

Alternatives 9 and 10 (the gas control system for the south parcel and the gas destruction facility, and the gas control system for the north parcel, respectively) were presented in the proposed plan as the preferred alternative. No significant changes have been made to these alternatives, although a modification of the conceptual design for the gas destruction facility may be required.

EPA originally proposed thermal destruction of the landfill gas using "flare" gas incinerators. The ARAR governing emissions from the thermal destruction of the landfill gas has been clarified (See the Statutory Determinations Section of the ROD). This ARAR limits emissions of CO to 550 pounds per day, and NOx to 100 pounds per day, and the exemption from the emissions offset requirements for landfill gas facilities is not allowable. Therefore, EPA may be required to either establish sufficient additional controls on the proposed landfill gas flares to achieve these requirements, or consider alternative gas incinerator designs which would allow further emissions controls. This change constitutes a minor modification of the proposed remedy. Thermal destruction will still be utilized and this modification will not significantly affect the cost of the selected remedy. Additional control equipment for flare emissions could increase the cost of the flare facility by $1 million. Use of alternative incinerator designs may increase the remedy costs by $1 to $2 million. Since the cost of the proposed remedy was previously estimated at $73 million, with an accuracy range of -30% to +50%, the cost of the remedy is not significantly affected.

If the emissions requirement for landfill gas destruction cannot practicably be achieved, EPA will invoke the waiver from these requirements under SARA, on the grounds that compliance with these requirements would cause more damage to human health and environment (by preventing collection and destruction of landfill gas at OII) than waiving them.

Comments were received which suggested that additional interim cover or partial final cover should be applied on the slopes of the landfill as part of this Operable Unit to further improve control of surface landfill gas emissions. The Feasibility Study deferred cover options for landfill gas control due to data limitations which impacted the technical feasibility of cover evaluation, design, and construction at this time. However, the Feasibility Study did note that integration with the cover would be required for control of surface emissions from the site. As information becomes available from studies conducted by EPA and/or other parties, or from Site Control and Monitoring activities, EPA will consider the feasibility of integrating additional interim cover or partial final cover with the construction of the selected gas control remedy, and this activity may be added to this Operable Unit. If information becomes available to allow development and evaluation of conceptual cover designs an opportunity for public comment on proposed cover alternatives may be offered, as appropriate.

Several of the alternatives in the Feasibility Study included resource recovery components, however, these were found not to be cost-effective, and therefore, were not included in the preferred alternative. Although the selected remedy does not include design and construction of a resource recovery component, it does allow for EPA to decide to design and construct a resource recovery component in the future if resource recovery becomes cost-effective, and such a decision is consistent with EPA's other decision making criteria.

DESCRIPTION OF ALTERNATIVES

GOALS AND OBJECTIVES

The goals and objectives for remediation include:

- Limiting methane concentration to less than 5 percent at the site boundary

- Controlling surface emissions of LFG such that total organic compound concentration is less than 50 ppm on the average and methane concentration is less than 500 ppm at any point on the surface through integration of the gas control remedy and the final cover for the site. Although, prior to final cover placement an interim goal will be to reduce surface emissions to a significant degree, a waiver from full compliance with this ARAR will be required until the final remedy is implemented.

- Minimizing the odor nuisance - this is directly associated with the reduction of surface emissions, and consequently, although odor reduction will be achieved prior to final cover placement, integration with the final cover will be required to fully address this problem

- Attaining applicable or relevant and appropriate standards, requirements, criteria, or limitations under other federal and state environmental laws according to the terms of Section 121 of SARA (For an operable unit compliance with ARARs (such as surface emissions control) may be waived if compliance is expected to be achieved through implementation of the final remedy.)

- Expediting implementation - sequencing and phasing remedial activities to rapidly mitigate identified gas problems

- Providing consistency with final remedies - considering potential effects of future remedial activities in developing alternatives to mitigate and minimize identified gas problems

- Integrating gas operations - optimizing migration control by integrating perimeter and interior gas extraction systems

- Using resource recovery technologies to the maximum extent practicable if cost-effective

SUMMARY OF GAS FS ALTERNATIVES

The alternatives which underwent detailed evaluation in the FS ranged from maintaining the existing LFG systems, to extensive additional well placements to extract LFG. LFG destruction systems ranged from simple flares to a LFG-fired steam boiler with electrical power generation.

Two of the alternatives included a resource recovery element that uses LFG combustion to generate steam and drive steam turbine electrical generators. These could provide electricity for sale to the local utility company.

Except for Alternatives 0 and 1 (no action and status quo, respectively), the emphasis of the alternatives is on increased collection and destruction or utilization of the LFG through thermal destruction. Other gas cleaning or processing technologies were eliminated during the initial screening of alternatives. Alternatives 1 through 9 are possible remedies for the south parcel and alternative 10 is for the north parcel.

Alternative 0

No Action. Walk away, cease extraction system and air dike operation.

Alternative 1

Status Quo. Operate existing systems as is.

- o Air dike--31 wells
- o OII system (scope wells)--79 wells
- o GSF system--64 wells
- o GSF flare station--1 blower, 1 flare
- o OII flare station--3 blowers, 3 flares

Methane collected--2.0 million standard cubic feet per day

- o Percent of methane generated--52 percent
- o Percent increase--0 percent

Alternative 2

Improve Alternative 1 by replacing the header line abovegrade, collecting condensate, and modifying, improving, and integrating the flare facilities.

Alternative 3

Minimal Additional Gas Extraction. Expansion of Alternative 2.

- o Replace air dike with extraction wells
- o 29 new perimeter wells
- o 25 new interior wells
- o New perimeter probes to monitor performance

Methane collected--2.4 million standard cubic feet per day

- o Percent of methane generated--63 percent
- o Percent increase--22 percent

Alternative 4

Intermediate Additional Gas Extraction. Expansion of Alternative 2.

- o Replace air dike with extraction wells
- o 41 new perimeter wells
- o 63 new interior wells
- o New perimeter probes to monitor performance
- o 1 new blower, and 1 new flare

Methane collected--2.9 million standard cubic feet per day

- Percent of methane generated--77 percent
- Percent increase--50 percent

Alternative 5

Maximum Additional Gas Extraction. Expansion of Alternative 2.
- Replace air dike with extraction wells
- 56 new perimeter wells
- 96 new interior wells
- New perimeter probes to monitor performance
- 2 new blowers, 2 new flares

Methane collected--3.4 million standard cubic feet per day
- Percent of methane generated--90 percent
- Percent increase--78 percent

Alternative 6

Alternative 5 with gas boiler and steam generator added.
- Net electric output--6.1 mw
- Net revenues--$2.4 million
- Duration of electric generation--10 years

Alternative 7

Replacement of existing systems with a completely new system.
- 59 new perimeter wells
- 180 new interior wells
- New perimeter probes to monitor performance
- 6 new blowers, 6 new flares

Methane collected--3.4 million standard cubic feet per day
- Percent of total methane--90 percent
- Percent increase--78 percent

Alternative 8

Alternative 7 with gas boiler and steam generator. Uses the same resource recovery system as Alternative 6.

Alternative 9

Modified Alternative 7. Uses existing gas extraction wells.
- 58 new perimeter wells
- 110 new interior wells

- o 105 existing wells
- o New perimeter probes to monitor performance
- o 6 new blowers, 6 new flares

Methane collected--3.4 million standard cubic feet per day

- o Percent of total methane--90 percent
- o Percent increase--78 percent

<u>Alternative 10</u>

North Parcel System.

- o 6 new wells and header line
- o Existing LFG monitoring probes
- o Integrated with South Parcel alternative for LFG destruction

Methane collected--.009 to .014 million standard cubic feet per day

In the FS, remedial action alternatives are described in sufficient detail to develop order-of-magnitude cost estimates (-30 to +50 percent) and to allow comparison of alternatives. They are based on the existing site data and understanding of site conditions as well as estimates of future conditions. Information presented concerning sizing of equipment, LFG flows, and extracted LFG quality is preliminary and is useful for evaluation and comparison of alternatives. Values to be used for design will be re-evaluated in the predesign or final design efforts. In addition, data collected as part of continuing site remedial investigation efforts will supplement understanding of current site conditions and may help in optimizing an alternative. Variations in design could include:

- o Number and placement of components such as header lines and extraction wells

- o Extraction rates

- o LFG quality (constituent concentration).

It should also be noted that Alternatives 2 through 8 include facilities for the collection of condensate and/or leachate which result from LFG migration control remedial actions. However, facilities and costs associated with condensate and leachate treatment and/or disposal are not included in these alternatives. Leachate and condensate will be managed under EPA's Leachate Management Remedial Action.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Alternative Nos. 0 through 2 are not acceptable gas control alternatives because the quantity of LFG collected would remain the same or decrease. The potential threat from fire and explosion, and contamination of the ambient air from surface emissions would continue.

Alternative No. 3 would provide additional partial control of LFG in some areas. However, control of subsurface migration to less than 5 percent methane and surface emissions to the SCAQMD requirements (when the final cover is implemented) are not expected to be achieved. Therefore, the potential threat from fire and explosion and the contamination of the ambient air from surface emissions would continue. The remedial goals and objectives, including overall protection of human health and the environment, compliance with ARARs, and long and short-term effectiveness would not be met.

Alternative No. 4 could possibly achieve control of subsurface migration and surface emissions in compliance with ARARs. However, this level of control is not considered to be likely. If this alternative does not achieve the ARARs, then the potential threat of fire and explosion and contamination of ambient air could continue, therefore this is not considered an effective alternative.

Alternative Nos. 5, 6, 7, 8 and 9 all have a high probability of controlling subsurface migration and surface emissions (when integrated with the final cover) to achieve ARARs. This level of control will eliminate the threat of fire and explosion and should reduce the amount of contaminants released to the ambient air to protective levels. These alternatives are, therefore, protective of public health and environment. All of these alternatives (5 through 9) are considered roughly equivalent in their effectiveness and implementability.

Alternative Nos. 6 and 8 include electrical generation resource recovery from the LFG. An economic analysis found that the net costs of implementation and operation and maintenance would be increased rather than reduced by these alternatives because the benefit to cost ratios for the resource recovery technologies are less than one. Therefore, these two alternatives were not found to be cost-effective.

Alternative 9 is more cost-effective than alternatives 5 and 7 because it uses existing wells and alternative well installation techniques. The 30-year present worth cost for this alternative (using a 3 percent discount rate) is estimated at $72 million, compared to $90 million for Alternative 5 and $96 million for Alternative 7. This alternative is also more reliable than Alternative 5 due to the complete replacement of the gas extraction and flaring facilities, and is therefore considered to offer better short and long-term effectiveness.

Alternative 10 is a separate component that will control gas migration in the subsurface and surface emissions from the North Parcel. This alternative is readily implementable and can be integrated with Alternative 9 which will provide LFG extraction and destruction facilities. The 30-year present worth cost of Alternative 10 is $1.1 million.

Tables 1 and 2 provide a brief comparison summary of the alternatives. These tables present information on EPA's decision making criteria of capital, operations and maintenance, and present worth costs, effectiveness, and compliance with ARARs. Table 3 provides a more detailed comparison of the alternatives. This table presents information on EPA's decision making criteria of overall protection of human health and environment (both short- and long-term effectiveness and permanence), implementability, and compliance with ARARs.

EPA's selected remedy is a combination of Alternatives 9 and 10. It offers a degree of protection of public health and environment that exceeds that of Alternatives 0 through 4, is equivalent to the protection offered by Alternatives 5 through 8, and is readily implementable.

The State of California, Department of Health Services, the Regional Water Quality Control Board, the City of Montebello, and the Los Angeles County Department of Health Services all support the selection of Alternatives 9 and 10 as the selected remedy. The local community group, H.E.L.P., Homeowners to Eliminate Landfill Problems, also support the selection of Alternatives 9 and 10.

The California Waste Management Board, and one local community member preferred Alternative 7 over Alternative 9, because they were opposed to the inclusion of functional existing gas extraction wells at OII. EPA considers it to be more cost-effective to include these functional wells rather than replacing them unnecessarily. EPA's selected remedy provides money to replace these wells when they are no longer functional, as part of yearly operations and maintenance.

Table 1
ALTERNATIVES COMPARISON SUMMARY
OII LFG MIGRATION CONTROL

Alternative No.	Alternative Description	Innovative or Resource Recovery Technology	Effectiveness: Estimated Additional LFG Collection (%)[b]	Effectiveness: Probability of Meeting or Exceeding ARARs	Cost Estimates ($ Millions)[a]: Capital Investment	Cost Estimates ($ Millions)[a]: O/M[c]
0	No Action	No	-	No	0	0
1	Status Quo	No	0	No	0	1.6
2	Improved Status Quo	No	0	No	5.8	1.5
3	Minimal Gas Extraction with LFG Flaring	No	+20	Partially	15.5	2.0
4	Intermediate Gas Extraction with LFG Flaring	No	+45	Possibly	23.3	2.5
5	Maximum Gas Extraction with LFG Flaring	No	+70	High Probability	32.1	3.0
6	Maximum Gas Extraction with LFG Boiler and Steam Power Generation	Yes	+70	High Probability	46.6	1.4[d] 3.0[e]
7	Replacement Gas Extraction with LFG Flaring	No	+70	High Probability	45.3	2.6
8	Replacement Gas Extraction with LFG Boiler and Steam Power Generation	Yes	+70	High Probability	59.8	1.0[d] 2.6[e]
9	Modified Replacement Gas Extraction with LFG Flaring	No	+70	High Probability	27	2.3
10	North Parcel System	No	+70	High Probability	0.4	0.038

[a]These costs are order-of-magnitude level estimates (i.e., the cost estimates have an expected accuracy of -30 to +50 percent).

[b]Percent increase over projected (based on LFG generation model) LFG collected in 1990 using existing LFG facilities.

[c]Operation/Maintenance, net estimated annual costs, 30 years, rounded off.

[d]Operation/Maintenance, net estimated annual costs, 0-10 years, rounded off.

[e]Operation/Maintenance, net estimated annual costs, 11-30 years, rounded off.

Table 2
NET PRESENT WORTH OF ALTERNATIVES

Alternative	Project Life	Present Worth Rates ($ millions) @3%	@5%	@10%
1	30 years	31.1	24.4	15.0
	45 years	37.5	27.2	15.1
	60 years	41.4	28.3	14.9
2	30 years	35.3	29.0	20.0
	45 years	41.6	31.7	20.2
	60 years	45.5	32.9	20.2
3	30 years	54.1	45.7	34.0
	45 years	62.3	49.4	34.3
	60 years	67.6	51.1	34.3
4	30 years	71.5	61.1	46.5
	45 years	82.1	65.9	46.9
	60 years	88.8	68.1	46.9
5	30 years	90.0	77.5	60.0
	45 years	103.0	83.5	60.6
	60 years	111.2	86.2	60.6
6	30 years	94.0	82.2	67.7
	45 years	107.0	88.8	68.4
	60 years	115.3	91.5	68.4
7	30 years	96.1	85.2	69.8
	45 years	107.6	90.4	70.3
	60 years	114.9	92.9	70.3
8	30 years	100.2	90.5	77.5
	45 years	111.6	95.8	78.1
	60 years	119.0	98.0	78.1
9	30 years	71.6	61.9	48.4
	45 years	81.5	66.5	48.8
	60 years	87.9	68.6	48.9
10	30 years	1.1	1.0	0.8
	45 years	1.2	1.0	0.7
	60 years	1.2	1.0	0.7

Table 3
EFFECTIVENESS EVALUATION OF ALTERNATIVES

Effectiveness Criteria	Alternative 0	Alternative 1	Alternative 2
<u>Protectiveness of Human Health and the Environment</u>			
o Estimated reduction in methane normally released as surface emissions and subsurface migration[a]	None	None	None
o Surface emissions control - comply with ARARs (less than 50 ppm average; 500 ppm maximum at any point); compliance requirement deferred to the final remedy	Will not comply	Will not comply	Will not comply
o Subsurface migration control - comply with ARARs (less than 5 percent at the boundary)	Will not comply	Will not comply	Will not comply
o Source control - LFG collection at the source	None	No additional source control	No additional source control
o Resource recovery	None	None	None
o Odor control	None	Inadequate	Inadequate
<u>Reliability</u>			
o Potential for poor performance or failure of system components (assuming design criteria represent actual field conditions)	NA	Poor reliability as evidenced by current operational problems at site	Improved reliability Slight reduction (not estimatable) due to system improvements
o Operational flexibility to address variations between design criteria and actual field conditions	NA	NA	System improvements are expected to allow greater flexibility in flare system operation and header maintenance

Table 3
(Continued)

Effectiveness Criteria	Alternative 3	Alternative 4	Alternative 5
Protectiveness of Human Health and the Environment			
o Estimated reduction in methane normally released as surface emissions and subsurface migration[a]	Reduction estimated at 0.4 mmscfd (22 percent reduction in methane release)	Reduction estimated at 0.9 mmscfd (50 percent reduction in methane release)	Reduction estimated at 1.4 mmscfd (78 percent reduction in methane release)
o Surface emissions control - comply with ARARs (less than 50 ppm average; 500 ppm maximum at any point); compliance requirement deferred to the final remedy	Additional extraction wells on slopes; monitoring data required to determine compliance; more likely to comply than Alternatives 1 and 2	More wells on slopes than Alternative 3; more likely to comply than Alternatives 2 and 3	Maximum well coverage of "add on" alternatives, more likely to comply than Alternative 4. High probability of compliance.
o Subsurface migration control - comply with ARARs (less than 5 percent at the boundary)	Additional extraction wells at the landfill perimeter; monitoring data required to determine compliance; not likely to comply	More wells on perimeter than Alternative 3; more likely to comply than Alternatives 2 and 3	Maximum well coverage of "add on" alternatives, more likely to comply than Alternative 4. High probability of compliance.
o Source control - LFG collection at the source	Additional interior wells will collect more LFG from within the refuse than Alternatives 1 and 2	More interior wells than Alternative 3 will collect more LFG	Maximum well coverage of "add on" alternatives; should provide greater degree of source control than Alternative 4.
o Resource recovery	None	None	None
o Odor control	Some reduction from additional wells on landfill slopes	Greater reduction in odors than Alternative 3	Greater reduction in odors than Alternatives 3 and 4
Reliability			
o Potential for poor performance or failure of system components (assuming design criteria represent actual field conditions)	Low; costs include periodic replacement of equipment, standby gas blower, and flare capacity	Reliability of LFG collection and flaring is same as Alternative 3	Reliability of LFG collection and flaring is same as Alternative 3
o Operational flexibility to address variations between design criteria and actual field conditions	Liquid/leachate pump provided for each well if necessary; use of oversized collection headers to allow additional well installations, flexibility limited by existing systems layout (i.e., header configuration and well design and placement).	Same as Alternative 3	Same as Alternative 3

Table 3
(Continued)

Effectiveness Criteria	Alternative 6	Alternative 7	Alternative 8
Protectiveness of Human Health and the Environment			
o Estimated reduction in methane normally released as surface emissions and subsurface migration[a]	Reduction estimated at 1.4 mmscfd (78 percent reduction in methane release)	Reduction estimated at 1.4 mmscfd (78 percent reduction in methane release)	Reduction estimated at 1.4 mmscfd (78 percent reduction in methane release)
o Surface emissions control - comply with ARARs (less than 50 ppm average; 500 ppm maximum at any point); compliance requirement deferred to the final remedy	Same as Alternative 5	Greatest potential for control due to integration of complete system through design and construction does not rely on existing well locations and header configuration. Improved reliability enhances protectiveness.	Same as Alternative 7
o Subsurface migration control - comply with ARARs (less than 5 percent at the boundary)	Same as Alternative 5	Greatest potential for control due to integration of complete system through design and construction does not rely on existing well locations and header configuration. Improved reliability enhances protectiveness.	Same as Alternative 7
o Source control - LFG collection at the source	Same as Alternative 5	Greatest potential for control due to integration of complete system through design and construction does not rely on existing well locations and header configuration. Improved reliability enhances protectiveness.	Same as Alternative 7
o Resource recovery	Power generation with LFG boiler/steam turbine generator; an estimated 6000 kW of power may be recovered	None	Power generation with LFG boiler/steam turbine generator; an estimated 6000 kW of power may be recovered
o Odor control	Same level of odor control as Alternative 5	Greatest potential for control due to integration of complete system through design and construction does not rely on existing well locations and header configuration. Improved reliability enhances protectiveness.	Same level of odor control as Alternative 7

Table 3
(Continued)

Effectiveness Criteria	Alternative 6	Alternative 7	Alternative 8
Reliability			
o Potential for poor performance or failure of system components (assuming design criteria represent actual field conditions)	Reliability of LFG collection and flaring is same as Alternative 3; power generation equipment requires high maintenance and is less reliable than other components	Reliability of LFG collection and flaring is greater than for all other alternatives because all facilities are new	Reliability of LFG collection and flaring is same as Alternative 3; power generation equipment requires high maintenance and is less reliable than other components. Overall reliability better than Alternative 6 but less than Alternative 7.
o Operational flexibility to address variations between design criteria and actual field conditions	Same as Alternative 3	Greatest flexibility, installation of complete new system is not tied to existing flare facilities, existing header configuration, or well design and location.	Same as Alternative 3

NA = Not Applicable.

[a] Reduction of methane normally released as surface emissions and subsurface migration are based on LFG generation and loss estimates projected for 1990. Normal methane losses in 1990 are defined as those that would occur utilizing existing facilities (e.g., as in Alternatives 1 and 2). Methane loss reductions presented are approximations based on assumptions and theoretical calculations. They are useful for purposes of comparing alternatives but do not reflect actual values.

Table 3
(Continued)

Effectiveness Criteria	Alternative 9	Alternative 10
Protectiveness of Human Health and the Environment		
o Estimated reduction in methane normally released as surface emissions and subsurface migration[a]	Reduction estimated at 1.4 mmscfd (78 percent in methane release) methane per day.	Reduction of estimated release of about 11,500 cubic feet of methane per day
o Surface emissions control - comply with ARARs (less than 50 ppm average; 500 ppm maximum at any point); compliance requirement deferred to the final remedy	Greater than Alternative 5, approximately equal to Alternative 7 once existing wells are replaced. High probability of compliance.	Likely to comply with the requirements
o Subsurface migration control - comply with ARARs (less than 5 percent at the boundary)	Greater than Alternative 5, approximately equal to Alternative 7 once existing wells are replaced. High probability of compliance when integrated with the final cover.	Most likely to comply with the requirements
o Source control - LFG collection at the source	Greater than Alternative 5, approximately equal to Alternative 7 once existing wells are replaced. High probability of compliance	Maximum well coverage
o Resource recovery	None	None
o Odor control	Greater than Alternative 5, approximately equal to Alternative 7 once existing wells are replaced. High probability of compliance	Would cut down odor nuisance with high probability of compliance.
Reliability		
o Potential for poor performance or failure of system components (assuming design criteria represent actual field conditions)	Reliability is high. All facilities other than existing wells will be new. Reliability will be the same as Alternative 7 when new wells are replaced.	Reliability is high and would increase with a new cap
o Operational flexibility to address variations between design criteria and actual field conditions	With the exception of existing well locations, great flexibility, installation of new system no tied to existing header configurations or flare facilities. Easier installation of pile driven and single completion wells improves flexibility	Use of oversize headers allows additional well installation

Table 3
IMPLEMENTABILITY EVALUATION OF ALTERNATIVES

Implementability Criteria	Alternative 0	Alternative 1	Alternative 2
Technical Feasibility			
o Use of proven technology	N/A	Gas extraction wells and gas flaring are currently used.	Gas extraction wells and gas flaring are currently used.
o Ease of installation and time to implement	N/A	N/A	Replacement and improvement of existing systems can be implemented within 1 year of project initiation.
o Short-term construction-related environmental impacts	N/A	N/A	Noise, LFG emissions, odors, and dust during excavation to be controlled.
o Short-term construction-related health risks	N/A	N/A	Potential contact with hazardous wastes. Requires appropriate health and safety procedures.
o Operational problems and considerations	N/A	Header line breakages; inadequate condensate collection; corrosion of equipment; lack of adequate safety and backup systems.	Problems should be reduced by recommended improvements.
Availability of Technology	N/A	N/A	Demonstrated technology in LFG applications. Equipment for gas extraction and flaring system improvements is readily available.
Operations and Maintenance	N/A	Continuation of existing long-term operating, maintenance, and monitoring of LFG facilities and site.	Requires long-term operating, maintenance, and monitoring of LFG facilities and site.
Administrative Feasibility			
o Administration of operating, maintenance, monitoring, and reporting activities	N/A	Continuation of existing operations.	Continuation of existing operations.
o Permitting considerations	N/A	None.	None.

N/A = Not applicable

Table 3
(Continued)

Implementability Criteria	Alternative 3	Alternative 4	Alternative 5
Technical Feasibility			
o Use of proven technology	Gas extraction wells and gas flaring are currently used.	Gas extraction wells and gas flaring are currently used.	Gas extraction wells and gas flaring are currently used.
o Ease of installation and time to implement	Straightforward; less than 2 years estimated for implementation. Well construction on slopes more difficult than perimeter wells.	Straightforward, but more wells installed; less than 2 years estimated for implementation. Well construction on slopes more difficult than perimeter wells.	Straightforward, but more wells installed; less than 2 years estimated for implementation. Well construction on slopes more difficult than perimeter wells.
o Short-term construction-related environmental impacts	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled.	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled.	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled.
o Short-term construction-related health risks	Potential contact with hazardous waste. Requires appropriate health and safety procedures.	Greatest potential for contact with hazardous waste. Requires appropriate health and safety procedures.	Greatest potential for contact with hazardous waste. Requires appropriate health and safety procedures.
o Operational problems and considerations	Problems are minimized by implementation of improvements recommended in Alternative 2.	Problems are minimized by implementation of improvements recommended in Alternative 2.	Problems are minimized by implementation of improvements recommended in Alternative 2.
Availability of Technology	Demonstrated technology in LFG applications. Equipment and supplies for gas extraction well installation and flare system expansion are available.	Demonstrated technology in LFG applications. Equipment and supplies for gas extraction well installation and flare system expansion are available.	Demonstrated technology in LFG applications. Equipment and supplies for gas extraction well installation and flare system expansion are available.
Operations and Maintenance	Requires long-term operating, maintenance, and monitoring of LFG facilities and site. Requires special personnel safety procedures due to potential hazard associated with LFG.	Same as Alternative 3, but larger in scope due to larger system.	Same as Alternatives 3 and 4, but larger in scope due to larger system.
Administrative Feasibility	Alternatives 5 and 6 should include permits required for expanded flare station. Permits for Alternative 3 are incomplete.		

Table 3
(Continued)

Implementability Criteria	Alternative 6	Alternative 7	Alternative 8
Administrative Feasibility			
o Administration of operating, maintenance, monitoring, and reporting activities	Larger scope than Alternatives 1 and 2.	Larger scope than Alternatives 1, 2, 3, and 4.	Larger scope than Alternatives 1, 2, 3, and 4.
o Permitting considerations expanded gas flaring system.	SCAQMD permits required for	Same as Alternative 3.	Sames as Alternative 3.
Technical Feasibility			
o Use of proven technology	Gas extraction wells and gas flaring are currently used at site. Boiler/steam turbine systems are widely employed.	Gas extraction wells and gas flaring are currently used at site.	Gas extraction wells and gas flaring are currently used at site. Boiler/steam turbine systems are widely employed.
o Ease of installation and time to implement	Same difficulty as Alternative 5; less than 2 years estimated for implementation.	Straightforward; more difficult than Alternatives 5 and 6 due to number of wells installed; less than 2 years estimated for implementation.	Straightforward; more difficult than Alternatives 5 and 6 due to number of wells installed; less than 2 years estimated for implementation.
o Short-term construction-related environmental impacts	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled.	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled.	Noise, LFG emissions, odors, and dust during drilling/excavation to be controlled
o Short-term construction-related health risks	Potential contact with hazardous waste. Requires appropriate health and safety procedures.	Potential contact with hazardous waste. Requires appropriate health and safety procedures.	Potential contact with hazardous waste. Requires appropriate health and safety procedures.
o Operational problems and considerations	Problems are reduced by implementation of improvements recommended in Alternative 2.	Problems are minimized by replacement of all existing facilities.	Problems are minimized by replacement of all existing facilities.
Availability of Technology	Same as Alternative 5. Boiler/steam turbine systems are readily available process equipment.	Same as Alternative 5.	Same as Alternative 5. Boiler/steam turbine systems are readily available process equipment.
Operations and Maintenance	Same as Alternative 5, but larger in scope.	Same as Alternative 5, but larger in scope.	Same as Alternative 5, but larger in scope.

Table 3
(Continued)

Implementability Criteria	Alternative 6	Alternative 7	Alternative 8
Administrative Feasibility			
o Administration of operating, maintenance, monitoring, and reporting activities	Larger scope than Alternative 5.	Same as Alternative 5.	Same as Alternative 6.
o Permitting considerations	Backup flaring systems must meet SCAQMD permitting requirements. Boiler NO_x emissions are minimized by ammonia injection process; emissions can be verified after installation.	Flaring systems must meet SCAQMD permitting requirements.	Backup flaring systems must meet SCAQMD permitting requirements. Boiler NO_x emissions are minimized by ammonia injection process; emissions can be verified after installation.

Table 3
(Continued)

Implementability Criteria	Alternative 9	Alternative 10
Technical Feasibility		
o Use of proven technology	Gas extraction wells and gas flaring are currently used at site	Gas extraction wells and gas flaring are currently used at South Parcel
o Ease of installation and time to implement	Straightforward, less difficult than Alternative 7 due to fewer new well installations and easier installation methods; less than 2 years estimated for implementation	Easier installation methods; estimated less than 1-year time for implementation
o Short-term construction-related environmental impacts	Noise, LFG emissions, odors, and dust during drilling/ excavation to be controlled.	Noise, LFG emissions, odors and dust during drilling excavation would be controlled.
o Short-term construction-related health risks	Potential contact with hazardous waste. Requires appropriate health and safety procedures. Pile driven wells reduce potential for hazardous waste contact.	Potential contact with hazardous waste. Requires appropriate health and safety procedures.
o Operational problems and considerations	Problems are minimized by replacement of all existing facilities, excluding functional extraction wells.	Problems will be minimized with proper design of extraction wells.
Availability of Technology	Demonstrated technology in LFG applications. Equipment and supplies for gas extraction well installation and flare system construction are available.	Demonstrated technology. Equipment and materials readily available.
Operations and Maintenance	Requires long-term operation and maintenance, and monitoring of LFG facilities and site. Requires special personnel safety procedures due to potential hazards associated with LFG.	Requires long-term operation and maintenance including monitoring. Requires trained personnel for safety procedures due to potential hazards associated with LFG.
Administrative Feasibility		
o Administration of operating, maintenance, monitoring, and reporting activities	Same as Alternatives 5 and 7	Same as other alternatives
o Permitting considerations	Same as Alternative 3	Same as other alternatives

SELECTED REMEDY - ALTERNATIVES 9 AND 10

ALTERNATIVE NO. 9--MODIFIED REPLACEMENT ALTERNATIVE

Although this alternative considers fewer new extraction wells than Alternative No. 7, it is designed to provide approximately the same level of protection by using existing extraction wells. This alternative includes the following major items:

- o Installing 58 new perimeter LFG extraction wells, as shown in Figure 5, with placement focused on minimizing offsite LFG migration.
- o Installing 48 pile driven wells on the top deck of the landfill with placement focused on maximizing source control of LFG.
- o Installing 50 shallow and 12 deep slope wells with placement focused on reducing surface emissions, and controlling intermediate to deep subsurface migration at the perimeter.
- o Installing new integrated perimeter and interior LFG headers (abovegrade).
- o Including functional existing gas extraction wells and gas monitoring probes.
- o Installing 58 multiple completion monitoring wells at the property boundary.
- o Installing landfill gas destruction facilities with a capacity of approximately 9,000 cfm, and an automated control station for the gas control system.
- o Installing abovegrade condensate sumps to collect condensate from gas headers.
- o Installing leachate pumps in gas wells to de-water saturated zones, and installing abovegrade leachate sumps.

The LFG extraction wells proposed in this alternative will be cross-tied such that all gas collected from the landfill can be mixed and sent to a unified gas destruction facility.

Well Construction

Four different types of gas extraction wells have been considered and included in Alternative No. 9 for control of the South Parcel LFG problems. The selection of different types of wells for different locations was based on landfill geometry, refuse characteristics, subsurface geology, and the expected effectiveness in controlling LFG at specific locations identified earlier in the OUFS report.

Initially, emphasis will be placed on perimeter extraction wells along the west and east ends of the landfill, where the most severe migration problems have been identified. Perimeter gas extraction wells at these locations will be drilled to depths equal the elevations of deepest refuse within 1,000 feet from the site boundary. Additional perimeter extraction wells will be sequenced according to a phased approach discussed under "Phasing of Alternatives." Perimeter extraction wells will be constructed as multiple completion wells with three or more well casings and screens at three or more depth intervals.

Wells on the slopes, particularly on the benches, will be drilled to a depth of between 60 to 90 feet by a drilling and/or driving method. These wells will be constructed with a single well casing with perforations and gravel packing at the bottom half of the well. In addition, to assist in perimeter migration control, about 12 deep single-casing wells are planned to be installed at the first bench. These wells would be installed along the west and east ends of the landfill. Along these boundaries, it is expected that approximately every third slope well on the first bench will be a deep well. The depth of such wells would be approximately 175 feet. Specific design of these deep wells would depend on conditions encountered during drilling.

Additional gas extraction wells will be placed on the top deck. These wells will be pile driven. The depth of these wells will be extended below the elevation of 450 feet throughout the landfill. At the western end of the landfill, depths may vary due to the suspected liquid/leachate problem.

Expected Longevity of Gas Extraction Wells

The expected longevity of each type of well discussed above depends on various landfill factors, quality of construction methods, and long-term operation and maintenance procedures.

Wells constructed within the refuse will experience wear and tear from the landfill settlement, corrosion and plugging of wells from landfill liquid/leachate, and from particulates/ sediment deposits clogging up well screens. Based on experience from the existing landfill gas extraction systems in Southern California, it is estimated that the wells within refuse will have an average life of 7.5 years. This estimate may be further revised based on actual drilling and construction experience encountered at site-specific locations.

Wells drilled within the native soil, specifically at the landfill perimeter, are expected to last longer. Average life expectancy of these wells is assumed to be 15 years. This expected longevity of the perimeter wells is based on information made available to EPA by the L.A. County Sanitation District.

As existing wells utilized by the South Parcel Alternative No. 9 require replacement, the location and design of the replacement will be optimized to improve performance.

The capital cost of Alternative 9 is estimated at approximately $27 million, and annual operations and maintenance is estimated at $2.3 million as shown in Table 4 (estimates are -30% to +50%).

ALTERNATIVE NO. 10--NORTH PARCEL SYSTEM

EPA's remedial investigation at the North Parcel found LFG within the landfilled portion of the site. This landfilled area contains approximately half a million cubic yards of refuse, and it is estimated that some gas will be produced for more than 30 years due to the continued anaerobic degradation of the refuse.

Based on the volume and depth of refuse, a conceptual layout of six gas extraction wells to control gas migration/emission from the North Parcel was prepared. (Figure 6 represents the schematic layout of the extraction system.) This extraction system will control existing and potential migration of gases from the property boundary and mitigate surface emissions from the landfilled portion of the North Parcel. This component includes the following major items:

- Installing 6 single completion extraction wells to the depth of refuse (up to 50 feet).

- Installing 1,500 feet of header lines.

Table 4
COST SUMMARY OF ALTERNATIVE NO. 9
MODIFIED REPLACEMENT ALTERNATIVE WITH LFG FLARING

Cost Items	Short-Term Capital Costs ($1,000's)
LFG Gas Extraction System Improvements	
New Perimeter	$8,000
New Interior	7,300
LFG Destruction System	
Type-Flare	900
Ancillary Items	
Protective Equipment	686
Decontamination and Disposal	28
Startup	90
Health and Safety	1,134
Construction-Related Equipment	858
Bid Contingency (5%)	949
Scope Contingency (10%)	1,899
Permitting and Legal (5%)	1,092
Services During Construction (8%)	1,747
Engineering Design (9%)	2,221
TOTAL (Rounded)	$26,900

Cost Item	Long-Term O&M Costs ($1,000's)
New LFG System	$2,280
TOTAL (Rounded)	$2,300

Note: Order-of-magnitude level estimates (expected accuracy range of -30 to +50 percent) at annual operation and maintenance costs.

LFG collected by this component will be fed to the flare system included in Alternative 9. The expected quantity of gas to be collected by the extraction system under this alternative may vary between 9,000 and 14,000 cubic feet of methane per day. The capital cost of this alternative is estimated at $400,000, and annual operations and maintenance is estimated at $38,000 as shown in Table 5 (estimates are -30% to +50%).

EMISSION ESTIMATES

The landfill gas disposal technologies used by the gas control alternatives all involve thermal destruction of the gas. In order to estimate potential emissions from the gas destruction technologies, a review of South Coast Air Quality Management District (SCAQMD) source test data was performed. This data was from actual emissions tests performed by SCAQMD on similar technologies (i.e., flares, boilers, etc.) used at other landfills in southern California. Estimates of emissions per million Btus of LFG destroyed by each technology were developed from this data base.

In addition, potential emissions from flares and various resource technologies were calculated using the maximum gas extraction rate of approximately 136 million Btus per hour. Flare and internal combustion engine emissions were estimated using the maximum emission factor, since the mean emissions factor developed from many nonhazardous waste landfills was not considered representative of the situation at OII.

All of the LFG destruction technologies are estimated to exceed SCAQMD's new source review requirements for carbon monoxide (550 pounds per day) and nitrogen oxides (100 pounds per day) at the maximum gas extraction rates using the maximum emission factor. Therefore, EPA may be required to either establish sufficient additional controls on the proposed landfill gas flares to achieve these requirements, or consider alternative gas incinerator designs which would allow further emissions controls.
This change constitutes a minor modification of the proposed remedy. Thermal destruction will still be utilized and this modification will not significantly affect the cost of the selected remedy. Additional control equipment for flare emissions could increase the cost of the flare facility by $1 million. Use of alternative incinerator designs may increase the remedy costs by $1 to $2 million. Since the cost of the proposed remedy was previously estimated at $73 million, with an accuracy range of -30% to +50%, the cost of the remedy is not significantly affected.

Table 5
COST SUMMARY OF ALTERNATIVE NO. 10
NORTH PARCEL SYSTEM

Cost Items	Short-Term Capital Costs ($1,000's)
LFG Gas Extraction System Improvements	
New Interior	$ 200
Ancillary Items	
Protective Equipment	30
Decontamination and Disposal	3
Startup	3
Health and Safety	2
Construction-Related Equipment	14
Bid Contingency (5%)	13
Scope Contingency (10%)	26
Permitting and Legal (5%)	15
Services During Construction (8%)	24
Engineering Design (9%)	30
TOTAL (Rounded)	$400

Cost Item	Long-Term O&M Costs ($1,000's)
New LFG System	$38
TOTAL (Rounded)	38

Note: Order-of-magnitude level estimates (expected accuracy range of -30 to +50 percent) at annual operation and maintenance costs.

If the emissions requirement for landfill gas destruction cannot practicably be achieved, EPA will invoke the waiver from these requirements under SARA, on the grounds that compliance with these requirements would cause more damage to human health and environment (by preventing collection and destruction of landfill gas at OII) than waiving them.

Initial EPA screening results indicate that exposure to the highest concentrations of pollutants would be expected within approximately 550 yards (one-half kilometer) from the site. Based on this initial screening, a location on the North Parcel farther away from nearby residents is considered to be the most suitable location for the LFG disposal equipment.

Additional modeling will be performed to account for the effects of local topography and meteorology on emissions from the LFG destruction equipment. Detailed modeling will be performed during the design phase to optimize disposal equipment placement. Source testing will be performed once a remedy is implemented in order to collect actual data on emissions and destruction efficiencies.

PHASING OF ALTERNATIVES

It is anticipated that the selected gas control remedy for the OII site will require a phased implementation in order to optimize protectiveness, implementability, cost-effectiveness, and consistency with the final remedy. A conceptual phased implementation approach is described below. Further consideration of the implementation strategy will be required during design and construction of the remedy, and may require modification of this conceptual approach.

PHASE 1A

- The purpose of Phase 1A is to implement perimeter migration control in the areas of highest priority (along the west, south and east boundaries of the South Parcel) to reduce the potential for explosive levels of methane gas to accumulate in nearby residential neighborhoods. This would be the initial phase of perimeter control in these areas, to be complemented by additional well installations, if necessary during Phase 2.

- The perimeter control system will be installed in areas accessible around the boundary of the site (this excludes most of the boundary along the Pomona freeway where no access road exists). The perimeter system will be designed and installed to be compatible with the final cover for the South Parcel.

- The perimeter system includes multiple completion gas wells (upper and lower screened intervals) and multi-depth gas monitoring probe installations. Extraction wells will be installed in the air dike area. Any potential benefits of using the air dike system in conjunction with the extraction wells will be explored.

- The flare station site will be prepared and a foundation constructed which will be adequate to handle the anticipated equipment needs of the entire gas remedy. Flares and hardware components to provide adequate capacity for the initial phase will be installed.

- Any existing systems included in the selected remedy would also be included in the implementation of Phase 1A.

PHASE 1B

- The purpose of this phase will be to increase the effectiveness of source control at the site. This increased source control may improve perimeter migration control, particularly in the deeper areas of gas migration, and reduce surface emissions.

- Additional interior source control wells will be installed on the top deck of the South Parcel. Installation will be designed to be compatible with the final cover for the South Parcel.

PHASE 2

- The purpose of this phase will be to improve gas control in the priority areas of the landfill perimeter. Cost-effectiveness will be optimized by limiting the number of wells installed during the initial phase, and following up with installation of additional wells only where required to achieve gas migration control during Phase 2.

- Installation of probes and wells in Phases 1A and 1B will also be phased. Additional gas wells and gas probes will be installed based on an evaluation of the effectiveness of the initial gas wells. These additional wells will be installed in areas where gas migration has not been controlled, and where it is considered to be prudent and consistent with the final remedy to install these wells. Additional flares and hardware will be installed as necessary.

PHASE 3

- The purpose of this phase will be to increase control of areas of high surface emissions prior to placement of the final cover in order to reduce the potential for exposure to the LFG in the ambient air.

- A limited number of shallow slope wells will be installed in areas of particularly high surface emissions. These wells will be designed to be consistent with the final remedy for the site. A limited number of wells will be installed during this phase, since application of final cover should increase the effectiveness of individual wells. Additional flares and hardware will be installed at the flare station as necessary.

PHASE 4

- As the final cover (selected in a future ROD) is installed at the site, it will be integrated with the existing control systems. The perimeter wells will be installed along the boundary with the Pomona Freeway. Additional perimeter wells, slope wells (shallow and, if necessary, deep), and top deck wells will be installed to achieve the CWMB requirement of less than 5 percent methane at the perimeter, and the SCAQMD 1150.1 surface emissions requirements of less than 50 ppm total organic compounds averaged over the surface and less than 500 ppm methane at any point on the surface.

PHASE X

- Expand the systems if necessary to control toxic and carcinogenic compounds in the gas to health based levels. The purpose of this phase will be to provide additional LFG control in areas where levels of hazardous LFG constituents are still being emitted at concentrations that could cause significant impacts to the public health.

PHASE Y

- o Install Alternative 10 on the north parcel, once it is determined that the north parcel waste mass will remain in place. This phase will allow integration of the gas control remedy for the north parcel with the south parcel control system.

The selected remedies described in this section are conceptual. Changes in the actual design and phasing approach may occur during design and construction. In addition, although analysis contained in the Feasibility Study and the Administrative Record indicated that resource recovery options were not expected to be cost-effective, EPA may decide to implement a resource recovery component if, in the future, it is determined to be cost-effective,and consistent with EPA's other decision making criteria.

STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The selected remedy will eliminate the risk of fire or explosion due to landfill gas accumulating offsite by controlling methane concentrations to less than 5 percent at the landfill boundary. Surface emissions and subsurface landfill gas migration will be reduced as will the potential for exposure to toxic and/or carcinogenic compounds contained in the landfill gas at OII. The landfill gas destruction facilities will be located and designed to provide adequate protection of human health and the environment from emissions which could be expected to occur. Monitoring of the selected remedy, once operational, will occur as part of operations and maintenance, the overall RI/FS, and/or 5-year remedy reviews, to ensure adequate protection of human health and environment.

Short-term risks associated with the remedy include risks posed by well installation, and operation and maintenance of the system, with the potential for exposure of workers to explosive levels of methane and high levels of toxic and/or carcinogenic compounds in the landfill gas. Landfill gas emissions from drilling activities should dissipate rapidly and are not expected to cause unacceptable short-term risks offsite. Health and safety activities will be conducted during construction, and operations and maintenance activities to ensure adequate protection of human health and environment. Other short-term risks during construction should be similar to those posed by most heavy construction projects. Construction activities will be conducted in accordance with applicable health and safety requirements.

Gas wells and probes will be designed to reduce the potential for cross-contamination of groundwater during construction and operation. Collection of leachate from saturated zones encountered by gas wells, and condensate collection from gas pipelines should reduce potential releases of contaminated liquids from the site.

The potential for landfill gas to contaminate groundwater will also be reduced by the increased gas collection afforded by the selected remedy.

No unacceptable short-term risks or cross-media impacts will be caused by implementation of the remedy.

Attainment of ARARs

The selected remedy will be designed to attain the following applicable regulations unless otherwise noted. ARARs were identified from Federal, as well as more stringent promulgated State environmental and public health laws.

Federal regulations apply to the leachate and condensate that will be collected from the gas control system. These liquids will be treated to the POTW pretreatment requirements in compliance with the Clean Water Act at an onsite treatment facility constructed under EPA's Leachate Management Remedial Action. Prior to the treatment plant construction these liquids will be transported to an offsite treatment facility in compliance with the Department of Transportation (DOT) Rules for the Transportation of Hazardous Materials, and in compliance with EPA's offsite disposal policy.

The State of California has the following ARARs which are enforced by various agencies:

1. Hazardous Waste Control Law (Administered by CA DOHS under Title 22, Division 4, Chapter 30) - The hazardous waste management requirements of this law are applicable and will be attained. The closure and post closure requirements will not be attained by this operable unit. A waiver is being invoked for this operable unit since closure and post closure requirements will be addressed by subsequent remedial actions at the site.

2. Solid Waste Management and Resource Recovery Act of 1972 (Administered by the California Waste Management Board and Los Angeles DOHS under Title 14, Division 7) - Requirements for monitoring and reporting for landfill gas migration, and migration control under Title 14, Section 17705 - Gas Control are applicable. A waiver is being invoked for the Title 14 closure and post closure requirements since they will be addressed by subsequent remedial actions at the site.

3. California Air Pollution Control Regulations - Ambient Air Quality Standards for Hazardous Substances (Administered by California Air Resources Board under Title 17, Section 70200.5) - Applicable standard for ambient concentrations of vinyl chloride not to exceed 10 ppb over a 24-hour period.

4. South Coast Air Quality Management District Rules and Regulations (The California Air Resources Board delegates state authority to SCAQMD to enforce air quality in the local basin.)

   <u>Regulation IV - Prohibitory Rules</u>

   Rule 401 - Visible Emissions - Limits visible emissions from any point source to Ringleman No. 1 or 20 percent opacity for 3 minutes in any hour.

   Rule 402 - Nuisance - This rule prohibits the discharge of any material (including odorous compounds) that cause injury, detriment, nuisance, or annoyance to the public, businesses, or property or endangers human health, comfort, repose, or safety. The selected remedy will require application of the final cover in order to adequately control odors at the site. Therefore a waiver is invoked for this ARAR since it will be addressed in subsequent remedial actions.

   Rule 403 - Fugitive Dust - This rule limits onsite activities such that concentrations of fugitive dust at the property line shall not be visible and the downwind particulate concentrations shall not exceed 100 micrograms per cubic meter above upwind concentrations.

   Rule 404 - Particulate Matter - This rule limits particulate emissions to a range of 0.010 to 0.196 grain per standard cubic foot depending on the volume of total stack gases.

Rule 407 - Liquid and Gaseous Air Contaminants - This rule limits carbon monoxide emissions to 2,000 ppm and sulfur dioxide emissions to 500 ppm. The sulfur dioxide limit does not apply if the fuel meets the provisions of Rule 431.1.

Rule 409 - Combustion Contaminants - This rule limits the emission of combustion contaminants to 0.10 grain per standard cubic foot at 12 percent carbon dioxide.

Rule 431.1 - Sulfur Content of Gaseous Fuels - This rule limits burning of fuel gas that has greater than 800 ppm hydrogen sulfide unless stack gases are cleaned to below the equivalent concentration.

Regulation XI - Source Specific Standards

Rule 1150.1 - Control of Gaseous Emissions from Active Landfills - This rule requires installation of a landfill gas control system and combustion, treatment and sale, or other equivalent method of landfill gas disposal. The rule requires perimeter landfill gas monitoring probes to evaluate offsite migration. It also limits concentrations of total organic compounds to 50 ppm over a certain area of the landfill, and limits maximum concentration of organic compounds (measured as methane) to 500 ppm at any point on the surface of the landfill. A final cover will be required to comply with this Rule and, therefore, a waiver is invoked for this operable unit because subsequent remedial actions will attain this ARAR.

Regulation XIII - New Source Review

Regulation 13 requires that whenever a permit is required for a new piece of equipment or modification to an existing piece of equipment at a facility or a site, that emissions be controlled using best available control technology (BACT) and that emissions be offset by other emissions reductions at the same facility or other nearby facilities. BACT is a series of emissions limits, process, and equipment specific requirements [see definition at 1301(e)]. The SIP is reviewed by the State Air Resources Board and the EPA for compliance under the Federal Clean Air Act. The net allowable cumulative increase in emissions are detailed in SCAQMD Rule 1303 and 1306.

Under SCAQMD Rule 1304(b)(2), there is an exemption from the offset requirements at 1303(b)(2)(C) for a landfill gas control or processing facility. The exemption waives the requirement to find enough criteria emissions offsets if the owner or applicant for the permit has: (1) provided all required offsets available by modifying sources owned; or (2) demonstrated to the satisfaction of the SCAQMD Executive Officer that the owner or applicant neither owns, nor operates other facilities within the district that could be modified to provide such offsets.

The State Implementation Plan (SIP) is reviewed by the State Air Resources Board and the EPA for compliance under the Federal Clean Air Act. However, EPA has not approved the exemption from the offset requirement, nor is such an exemption approvable as part of the SIP (40 CFR 51.165). Therefore, the offset requirement as contained in the SIP applies.

Moreover, on August 31, 1988, a moratorium on construction or modification of major stationary sources of carbon monoxide and volatile organic compounds went into effect (53 FR 1780; 40 CFR 52.24). A major source is defined as one which emits or has the potential to emit in excess of 100 tons per year of a specified pollutant. Flares may be considered to have the potential to emit in excess of 100 tons of CO per year.

Additional ARARs for Resource Recovery Equipment

1. SCAQMD Regulation IV - Prohibitory Rules

Rule 474 - Fuel-Burning Equipment Oxides of Nitrogen - This rule limits the concentration of oxides of nitrogen to a range of 125 to 300 ppm for gaseous fuels depending on maximum gross heat input.

Rule 476 - This rule applies to boilers larger than 50 million BTU per hour. Oxides of nitrogen may not exceed 125 ppm, combustion contaminants may not exceed 11 pounds per hour and 0.01 grains per standard cubic foot.

Future ARARs

Because of the failure of the South Coast Air Basin to attain the ozone and carbon monoxide standard by the statutory deadline, EPA has been required by the courts to promulgate a Federal Implementation Plan (FIP) which would expeditiously achieve those standards. Since EPA has not yet proposed a FIP, no FIP requirements apply to the OII gas control remedial action at the present time. However, EPA may promulgate a final FIP within one year. The FIP will likely contain additional stringent requirements for new and existing sources. Some of these requirements may apply to the OII gas control remedial action. Also, such requirements may constitute ARARs at the time of the 5-year review, and may necessitate further controls.

Cost-Effectiveness

The selected remedy affords overall effectiveness proportional to its cost such that the remedy represents a reasonable value for the money. When the relationship between cost and overall effectiveness of the selected remedy is viewed in light of the relationship between cost and overall effectiveness afforded by the other alternatives, the selected remedy appears to be cost-effective. The selected remedy provides protection of public health and environment that exceeds that of Alternatives 0 through 4, and is equivalent to the protection offered by Alternatives 5 through 8 (when integrated with Alternative 10). The two resource recovery alternatives (6 and 8) were found not to be cost-effective. The benefit to cost ratios for these two alternatives were less than one, indicating that the net costs of implementation and operation and maintenance would be increased rather than reduced by these alternatives. The 30 year present worth costs of Alternatives 5 and 7 (combined with Alternative 10 to provide similar degrees of protection) are estimated at $91 million and $97 million respectively compared to $73 million for the selected remedy. The estimated present worth cost of the selected remedy is equivalent to the estimated present worth cost of Alternative 4 combined with Alternative 10, which provides less control of subsurface gas migration and surface emissions (with the potential for explosive levels of landfill gas to continue migrating offsite) than the selected remedy.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy utilizes permanent solutions and treatment or resource recovery technologies to the maximum extent practicable. The landfill gas which is collected by the selected remedy will be incinerated in flares. The flares or other gas incinerators represent a permanent solution for landfill gas destruction because the methane is burned and over 99 percent of the hazardous constituents in the gas stream are destroyed. Most of the remaining emissions from the flares are susceptible to ultraviolet degradation.

Several resource recovery options were evaluated in the Feasibility Study, however, it was determined not to be practicable to implement resource recovery technologies at this time. Resource recovery was determined not to be practicable due to the local utility company's (Southern California Edison) electrical capacity surplus, and the low anticipated electrical buy-back rates during the life of a resource recovery project. Other resource recovery technologies which did not involve electrical generation were also evaluated in the FS but were found not to be practicable due to high cost, technical feasibility, market considerations, etc.

If, in the future, the situation changes and resource recovery becomes a viable option at the site, the EPA will reconsider implementing a resource recovery component.

Preference for Treatment as a Principal Element

The selected remedy satisfies the preference for treatment to address principal threats posed by the site (within the scope of the operable unit). It is estimated that 90 percent of the methane gas produced at the site (as well as the associated toxic and carcinogenic compounds contained in the gas stream) will be collected by the selected remedy. This represents a 78 percent reduction in the volume of methane gas currently escaping from the site. The gas will be incinerated using landfill gas flares or other incinerators which have a destruction efficiency of over 99 percent for most of the hazardous compounds in the landfill gas. In addition, leachate and condensate (hazardous liquids) collected by the gas control system will be treated under EPA's Leachate Management Remedial Action. Therefore, the selected remedy will reduce the toxicity, mobility, and volume of the landfill gas, leachate, and condensate through the use of extraction, collection, and treatment.

Additional information concerning EPA's remedy selection criteria is included in the Summary of Comparative Analysis of Alternatives Section of this ROD, and in the OUFS, and the Administrative Record.